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Yosemite Valley and to the Monterey Peninsula and the Carnegie Desert Laboratory at Carmel.

The sections and societies meeting independently or in conjunction with these sections upon this occasion were as follows:

Section A, Mathematics and Astronomy.
 Section B, Physics.
 Section F, Zoology.
 Section G, Botany.
 Section H, Anthropology and Psychology.
 Section L, Education.
 Section M, Agriculture.
 Astronomical Society of the Pacific.
 American Astronomical Society.
 American Mathematical Society.
 American Physical Society.
 Geological Society of America and the Cordilleran Section.
 Paleontological Society.
 Seismological Society of America.
 American Society of Naturalists.
 American Society of Zoologists.
 Biological Society of the Pacific.
 Entomological Society of America.
 American Association of Economic Entomologists (August 9 and 10).
 Pacific Slope Association of Economic Entomologists (August 9 and 10).
 American Phytopathological Society.
 American Fern Society.
 American Psychological Association.
 American Association for the Study of the Feeble-Minded.
 American Anthropological Association.
 Archeological Institute of America.
 American Genetic Association.
 Association of American Dairy, Food and Drug Officials.

Altogether over ninety sessions of the association, of sections and of other societies were held during this week of meetings.

The total registered attendance at these meetings of members of the association or of participating societies was 606. In addition to this registration the names were given of 174 ladies accompanying members of the societies. The attendance from states and from abroad was distributed as follows:

Arizona, 7
 California, 300

Colorado, 4
 Connecticut, 4

Delaware, 1
 Florida, 1
 Idaho, 5
 Illinois, 9
 Indiana, 2
 Iowa, 6
 Kansas, 8
 Louisiana, 4
 Maine, 1
 Maryland, 5
 Massachusetts, 12
 Michigan, 1
 Minnesota, 9
 Mississippi, 1
 Missouri, 13
 Montana, 4
 Nebraska, 8
 Nevada, 10
 New Hampshire, 1
 New Jersey, 5
 New Mexico, 3
 New York, 24
 North Dakota, 2
 Ohio, 9
 Oklahoma, 1
 Oregon, 25

Pennsylvania, 8
 Rhode Island, 1
 South Carolina, 1
 South Dakota, 1
 Tennessee, 1
 Texas, 8
 Utah, 9
 Vermont, 1
 Virginia, 1
 Washington, 19
 Washington, D. C., 31
 West Virginia, 2
 Wisconsin, 3
 Wyoming, 2
 Canada, 7
 China, 1
 Cuba, 1
 Denmark, 1
 England, 3
 Hawaiian Islands, 8
 Japan, 4
 Mexico, 2
 New Zealand, 1
 Philippine Islands, 3
 Sweden, 1
 Syria, 1

ALBERT L. BARROWS,
Secretary, Pacific Division

FARMING AND FOOD SUPPLIES IN TIME OF WAR¹

AGRICULTURE is the antithesis of warfare; farming is preeminently a peaceful avocation, and farmers are essentially men of peace. The husbandman is not easily disturbed by war's alarms, and his intimate association with the placid and inevitable processes of nature engenders a calmness of spirit which is unshaken by catastrophe. Many stories illustrative of this attitude of mind come to us from the battlefields. The complete detachment of the fighting men from the rest of the community which was usual up to quite recent times is impossible in these days when in almost every country the army is not a class but the nation. It is inconceivable now that a war could rage of which it could be said, as has been said of our civil war:

Excepting those who were directly engaged in the struggle, men seemed to follow their ordinary

¹ Address of the president to the Agricultural Section of the British Association for the Advancement of Science, Manchester, 1915.

business and their accustomed pursuits. The story that a crowd of country gentlemen followed the hounds across Marston Moor, between the two armies drawn up in hostile array, may not be true; but it illustrates the temper of a large proportion of the inhabitants.²

But, while farmers and peasants within the range of the guns can not now ignore the fighting, they have repeatedly demonstrated their invincible determination that the madness of mankind shall not interrupt the calm sanity of the ordered cultivation of the soil. Of a district in the Argonne, a correspondent, writing in April last, said:

The spring seed has already been sown or is being sown, sometimes indifferently, under shell-fire, right up to the edge of the trenches.³

A story was told of a farmer in Flanders looking over the parapet of a trench and demanding of an indignant British officer whether any of his men had stolen his pig. On receiving a suitable reply, he observed that he had already asked the French, who also denied all knowledge of the missing animal, so that he supposed it must be those condemned Germans, whom he forthwith proceeded to interview. Such a sublime sense of values, such absorption in the things that matter, such contempt for the senseless proceedings of warfare, are only possible to the agriculturist. The quarrels of mankind are transient, the processes of nature are eternal. One thinks of Matthew Arnold's lines:

The East bowed low before the blast
In patient deep disdain;
She let the legions thunder past,
And plunged in thought again.

But, while the farmer is by instinct a pacifist, he is also, in a cause which rouses him, a doughty fighter. In that same civil war to which so many were indifferent, the farmers of East Anglia, under Cromwell,

² Prothero, "English Farming, Past and Present," p. 104.

³ *Westminster Gazette*, April 30, 1915.

changed the course of English history; and the thoroughness with which they turned their ploughshares into swords is demonstrated by the fact that when they took to soldiering they put the nation for the first and only time under what is now termed militarism; that is, government controlled by the army. In the last battle fought on English soil the yeomen and peasants of the West Country proved, amid the butchery of Sedgemoor, that bucolic lethargy can be roused to desperate courage. Indeed, through all our island story, since the English yeomen first broke the power of mediæval chivalry and established the supremacy of infantry in modern warfare, it has been from the rural districts that the nation has drawn its military strength. Even in the present war, when the armies of the empire have been drawn from all classes of the community, the old county regiments and the yeomanry squadrons with their roots in the countryside have proved once more that the peaceful rustic is as undismayed on the field of battle as on the fields of peace.

It is, however, in his pacific rather than in his belligerent aspect that the British farmer now claims our attention, and, before considering the position of farming in the present war, we may briefly glance at its position when a century ago the nation was similarly engaged in a vital struggle.

From February 1793 until 1815, with two brief intervals, we were at war, and the conflict embraced not only practically all Europe but America as well. The latter half of the eighteenth century had witnessed a revolution of British agriculture. The work of Jethro Tull, "Turnip" Townshend, Robert Bakewell, and their disciples, had established the principles of modern farming. Coke of Holkham had begun his missionary work; Arthur Young was preaching the gospel of progress; and in 1803 Humphry Davy delivered his epoch-ma-

king lectures on agricultural chemistry. Common-field cultivation, with all its hindrances to progress, was rapidly being extinguished, accelerated by the General Inclosure Act of 1801. A general idea of the state of agriculture may be obtained from the estimates made by W. T. Comber of the area in England and Wales under different crops in 1808. There were then no official returns, which, indeed, were not started until 1866; but these estimates have been generally accepted as approximately accurate and are at any rate the nearest approach we have to definite information.

I give for comparison the figures from the agricultural returns of 1914, which approximately correspond to those of the earlier date:

	1808 Acres	1914 Acres
Wheat	3,160,000	1,807,498
Barley and rye	861,000	1,558,670
Oats and beans	2,872,000	2,223,642
Clover, rye-grass, etc...	1,149,000	2,558,735
Roots and cabbages cultivated by the plough	1,150,000	2,077,487
Fallow	2,297,000	340,737
Hop grounds	36,000	36,661
Land depastured by cattle	17,479,000	16,115,750

The returns in 1914 comprise a larger variety of crops than were cultivated in 1808. Potatoes, for instance, were then only just beginning to be grown as a field-crop, and I have included them together with Kohl-rabi and rape, among "roots and cabbages."

The population of England and Wales in 1801 was 8,892,536, so that there were 35½ acres under wheat for every hundred inhabitants. In 1914 the population was 37,302,983, and for every hundred inhabitants there were 5 acres under wheat.

The yield of wheat during the twenty years ending 1795 was estimated at 3 qrs.

per acre;⁴ in 1914 it was 4 qrs. per acre. The quantity of home-grown wheat per head of population was therefore 8½ bushels in 1808, and 1½ bushels in 1914. Nevertheless, even at that time, the country was not self-supporting in breadstuffs. In 1810, 1,305,000 qrs. of wheat and 473,000 cwt. of flour were imported. The average annual imports of wheat from 1801 to 1810 were 601,000 qrs., and from 1811 to 1820 458,000 qrs. Up to the last decade of the eighteenth century England was an exporting rather than an importing country, and bounties on exports were offered when prices were low, from 1689 to 1814, though none were, in fact, paid after 1792.

During the war period we are considering, the annual average price of wheat ranged from 49s 3d per qr. in 1793 to 126s 6d per qr. in 1812; the real price in the latter year, owing to the depreciation of the currency, being not more than 100s. In 1814 the nominal price was 74s 4d and the real price not more than 54s per qr.⁵ The extent to which these high and widely varying prices were affected by the European war has been the subject of controversy. As we mainly depended on the Continent for any addition to our own resources, the diminished production during the earlier years in the Netherlands, Germany and Italy, and in the later years of the war in Russia, Poland, Prussia, Saxony and the Peninsula, reduced possible supplies. At the same time the rates of freight and insurance, especially in the later years of the war, increased very considerably. Tooke mentions a freight of £30 per ton on hemp from St. Petersburg in 1809. On the other hand, a powerful impetus was given

⁴ Report of Select Committee on the means of promoting the cultivation and improvement of the waste, uninclosed and unproductive lands of the kingdom, 1795.

⁵ Porter's "Progress of the Nation," by F. W. Hirst, p. 183.

to home production, which was stimulated by government action and private enterprise. Inclosure was encouraged by the General Inclosure Act of 1801, and 1,934 Inclosure Acts were passed from 1793 to 1815. The schemes for increasing and conserving food supplies were various. The Board of Agriculture, for example, offered prizes of 50, 30 and 20 guineas, respectively, to the persons who in the spring of 1805 cultivated the greatest number of acres—not less than 20—of spring wheat.⁶ In 1795 a Select Committee recommended that bounties should be granted to encourage the cultivation of potatoes on “lands at present lying waste, uncultivated, or unproductive,” and that means should at once be adopted to add at least 150,000 and perhaps 300,000 acres to the land under cultivation “as the only effectual means of preventing that importation of corn, and disadvantages therefrom, by which this country has already so deeply suffered.” Another view of importation is presented by Tooke, who, in a discussion of the effect of the war, says:

Although the war can not have been said to have operated upon the supply of agricultural produce of our own growth and other native commodities, sufficiently to outweigh the circumstances favorable to reproduction, it operated most powerfully in increasing the cost of production and in obstructing the supply of such commodities as we stood in need of from abroad. It is therefore to war chiefly as affecting the cost of production and diminishing the supply, by obstructions to importation, at a time when by a succession of unfavorable seasons our own produce became inadequate to the average consumption, that any considerable proportion of the range of high prices is to be attributed.⁷

The main cause of high prices and scarcity was the failure of the harvests. Mr.

Prothero thus analyses the wheat harvests of the twenty-two years 1793–1814:

Fourteen were deficient; in seven out of the fourteen the crops failed to a remarkable extent, namely in 1795, 1799, 1800, 1809, 1810, 1811, 1812. Six produced an average yield. Only two, 1796 and 1813, were abundant; but the latter was long regarded as the best within living memory.⁸

It appears paradoxical, but in a sense it is true, to say that the scarcity of wheat in certain years arose from the fact that the country was too largely dependent on its own crop. The risk of a bad harvest in a climate such as that of the British Isles must always be serious, and by the fortune of war this risk between 1793 and 1814 turned out to be very high. When supplies are drawn from the four quarters of the globe, it is evident that the risk of a shortage in time of peace is greatly reduced. Whether in a great war it is preferable to be more dependent on the sea than on the season is debatable.

In comparison with wars for national existence, such as that against Napoleon and in a still sterner sense that in which we are now engaged, other conflicts appear insignificant. The Crimean War, however, did affect our food supplies and had a reflex action on British agriculture. The cessation of imports from Russia caused a rise in the price of corn. The average price of wheat rose to 72s 5d per qr. in 1854, 74s 8d in 1855 and 69s 2d in 1856. Only once before (in 1839) during the previous thirty-five years had it risen above 70s. There were then no agricultural returns, but the estimates of Lawes, which were generally accepted, put the area under wheat at a little more than 4,000,000 acres, a higher figure than has been suggested for any other period. It is, indeed, highly probable that the Crimean War marked the maximum of wheat cultivation in this coun-

⁶ “Annals of Agriculture,” 1805.

⁷ “History of Prices,” ed. 1838, Vol. I., p. 116.

⁸ “English Farming, Past and Present,” p. 269.

try. It was a time of great agricultural activity and of rapid progress. To their astonishment, farmers had found, after an interval of panic, that the repeal of the corn laws had not obliterated British agriculture and that even the price of wheat was not invariably lower than it had often been before 1846. Caird had preached "high farming" in 1848 and found many disciples, capital was poured into the land, and the high prices of the Crimean period stimulated enterprise and restored confidence in agriculture.

To generalize very roughly, it may be said that while the Napoleonic wars were followed by the deepest depression in agriculture, the Crimean War was followed by a heyday of agricultural prosperity which lasted for over twenty years. What the agricultural sequel to the present war may be, I leave to others to estimate, and I turn to consider briefly some of its effects on British farming up to the present time.

Harvest had just begun when war broke out on August 4; indeed, in the earlier districts a good deal of corn was already cut. The harvest of 1914 was, in fact, with the exception of that of 1911, the earliest of recent years, as it was also one of the most quickly gathered. The agricultural situation may perhaps be concisely shown by giving the returns of the crops then in hand, *i. e.*, in course of gathering or in the ground, with the numbers of live stock as returned on farms in the previous June. The figures are for the United Kingdom, and I add the average for the preceding ten years for comparison:

	1914 Qrs.	Average 1904-13 Qrs.
Wheat	7,804,000	7,094,000
Barley	8,066,000	7,965,000
Oats	20,664,000	21,564,000
Beans	1,120,000	1,059,000
Peas	374,000	525,000

	Tons	Tons
Potatoes	7,476,000	6,592,000
Turnips and swedes ..	24,196,000	26,901,000
Mangold	9,522,000	9,934,000
Hay	12,403,000	14,148,000
	Cwts.	Cwts.
Hops	507,000	354,000
	No.	No.
Cattle	12,185,000	11,756,000
Sheep	27,964,000	29,882,000
Pigs	3,953,000	3,805,000
Horses	1,851,000	2,059,000

Farmers had thus rather more than their usual supplies of nearly every crop, the chief deficiencies being in peas, roots and hay. The shortage of the hay-crop was, however, in some measure made up by the large stocks left from the unusually heavy crop of 1913. It was fortunate from the food-supply point of view that two of the most plentiful crops were wheat and potatoes. The head of cattle was very satisfactory, being the largest on record, and pigs were well above average. Sheep, always apt to fluctuate in numbers, were much below average, the total being the smallest since 1882 with the exception of 1913.

On the whole, it was a good year agriculturally, and the supply of home-grown produce at the beginning of the war was bountiful. Nature at any rate had provided for us more generously than we had a right to expect.

At first it appeared as if farmers were likely to be sufferers rather than gainers by the war. Prices of feeding-stuffs, especially linseed and cotton-cakes; maize-meal, rice-meal and barley-meal, rose at once, recruiting affected the labor supply, and difficulties arose in the distribution of produce by rail. With one or two exceptions, such as oats, the prices of farm produce showed but little rise for three or four months after the war began. Wheat rose about 10 per cent., barley remained about normal, cattle

by November had not risen more than 3 per cent., sheep and veal-calves showed no rise until December, while poultry was actually cheaper than usual, though eggs rose considerably. Butter rose slightly, and cheese remained about normal. Up to nearly the end of the year, in fact, it may be said generally that British farm-produce made very little more money than usual.

Meanwhile the nation began to take a keen interest in the agricultural resources of the country, and farming became the object of general solicitude. We started with great energy to improvise, in truly British fashion, the means of facing the supreme crisis of our fate, but the elementary fact at once became obvious that it is impossible to improvise food. The main farm-crops take an unreasonably long time to grow, even if the land is prepared for them, and a sudden extension of the area under cultivation is not a simple proposition. It was freely pointed out—with undeniable truth—that our agricultural system had not been arranged to meet the conditions of a great European war, and many suggestions were made to meet the emergency. Some of these suggestions involved intervention by legislative or administrative action. It was decided that any attempt violently to divert the course of farming from its normal channels would probably not result in an increased total production from the land. The agricultural consultative committee, appointed by the president of the board of agriculture on August 10, issued some excellent advice to farmers as to their general line of policy and the best means by which they could serve the nation, and this was supplemented by the board and by the agricultural colleges and local organizations throughout the country. No less than thirty special leaflets were issued by the board, but, while it may, I think, fairly be claimed that all the re-

commendations made officially were sound and reasonable, I should be the last to aver that farmers were universally guided by them. They do not accept official action effusively:

Unkempt about those hedges blows
An English unofficial rose,

and official plants do not flourish naturally in farm hedgerows. It was, however, fairly evident that patriotism would suggest an effort to obtain the maximum production from the land, and there were good reasons to think that self-interest would indicate the same course. It must be admitted, however, that during the autumn the lure of self-interest was not very apparent. Food-prices, however, at the end of the year began to rise rapidly. English wheat in December was 25 per cent. above the July level, in January 45 per cent., in February and March 60 per cent., and in May 80 per cent. Imported wheat generally rose to a still greater extent, prices in May standing for No. 2 North Manitoba 95 per cent., and No. 2 Hard Winter 90 per cent. above July level. The greater rise in imported wheat may be noted as vindicating farmers against the charge which was made against them of unreasonably withholding their wheat from the market. Cattle and sheep rose more slowly, but in March prices of both had risen by 20 per cent., and in May and June cattle had risen by about 40 per cent. Butter rose by about 20 per cent. and cheese by about 40 per cent. Milk rose little through the winter, but when summer contracts were made prices remained generally at the winter level.

British agriculture, like the British Isles, is a comparatively small affair geographically. The 47 million acres which it occupies, compared with the 80 million acres of Germany or the 90 million acres of France, and still more with the 290 million acres of the United States, represent an

area which may be termed manageable and about which one might expect to generalize without much difficulty. But, in fact, generalization is impossible. Even on the 27 million acres of farm land in England and Wales there is probably more diversity to the square mile than in any country on earth. The variations in local conditions, class of farming, and status of occupier preclude the possibility of making any general statement without elaborate qualifications. Thus whatever one might say as to the effects of the war on agriculture would be certain to be inaccurate in some districts and as regards some farmers.

There are three main agricultural groups, corn-growing, grazing and dairying. They overlap and intermingle indefinitely, and there are other important groups, such as fruit-growing, vegetable-growing, hop-growing, etc., which represent a very large share of the enterprise and capital engaged on the land. The receipts of the corn-growing farmer generally speaking were substantially increased. Probably about 50 per cent. of the wheat-crop had been sold before prices rose above 40s per quarter, and there was very little left on the farms when they reached their maximum in May. Oats rose rather more quickly, but did not reach so high a level, relatively, as wheat. Barley—owing perhaps to enforced and voluntary temperance—never made exceptional prices, and in fact the best malting barleys were of rather less than average value. There is no doubt, however, that farmers who depended mainly on corn-growing found an exceptionally good market for their crops and made substantial profits. Farmers who depended mainly on stock were less generally fortunate, although stock were at a fairly high level of price when the war began. Sheep for some time showed no signs of getting dearer, but in the spring prices rose substantially, and

a good demand for wool—which in one or two cases touched 2s per lb.—made the flockmasters' returns on the whole very satisfactory. Cattle followed much the same course; stores were dear, but by the time fat stock came out of the yards or off the grass prices had risen to a very remunerative level. The large demands on imported supplies of meat for the British and French armies occasioned a distinct shortage for the civil population, but this was relieved by a reduced demand, so that the effect upon prices of native beef and mutton was not so great as might have been expected. The influence of a rise of price upon demand is more marked in the case of meat than in that of bread. While there has been a distinct reduction in the consumption of meat, there is no evidence of a reduced consumption of bread.

Dairy farmers generally found themselves in difficulties. Prices of butter and cheese increased but slightly, and milk remained for a considerable period almost unchanged. The rise in the prices of feeding-stuffs and the loss of milkers aggravated their troubles. An actual instance of the position in February as affecting a fairly typical two-hundred acre farm may be quoted. It had thirty milch cows producing about 16,500 gallons per annum. The cake bill showed an advance of fifty per cent., and wages had risen twelve per cent. It was calculated that the extra cost was 1.3d per gallon of milk. Later the prices of milk, butter and cheese rose, but on the whole it can not be said that dairy farmers generally made exceptional profits.

While it is certain that the gross receipts by farmers were substantially increased, it is very difficult to estimate what the net pecuniary gain to agriculture has been. It can only be said generally that while some have made substantial profits, which were probably in very few cases excessive, many others have

on balance (after allowing for extra cost) done no better financially, and some perhaps even worse, than in an average year of peace. With regard to one item of extra cost, that of labor, it is possible to make an approximate estimate. Agricultural laborers were among the first to respond to the call for the new armies, and, up to the end of January, fifteen per cent. had joined the forces of the Crown. This considerable depletion of labor was not acutely felt by farmers during the winter, but during the spring and summer serious difficulty was experienced and many devices were suggested—some of which were adopted—for meeting it. Naturally the wages of those agricultural laborers who were left rose, the rise varying in different districts but being generally from 1s 6d to 3s per week. Owing to the rise in the price of commodities, this increase of wages can not be regarded as a profit to the laborers, but it is, of course, an outlay by farmers, which in England and Wales may be reckoned as amounting to an aggregate of about £2,000,000.

This country has never suffered from a dearth of agricultural advisers, and in such a time as the present, when every one is anxious to help the country, it is natural that they should be unusually plentiful. Advice was freely offered both to the government how to deal with farmers and to farmers how to deal with the land. Whether in consequence of advice or in spite of it, it may fairly be said that farmers throughout the United Kingdom have done their duty. They have met their difficulties doggedly and have shown an appreciation of the situation which does credit to their intelligence. It was not easy last autumn when farmers had to lay their plans for the agricultural year to forecast the future. We were all optimists then, and many thought that the war might be over before

the crops then being planted were reaped. It was clear, however, that the national interest lay in maintaining and, so far as possible, increasing the produce of the land. In the quiet, determined way which is characteristic of them, farmers devoted themselves to the task, and the returns recently issued give the measure of their achievement. They have added twenty-five per cent. to the acreage of wheat and seven per cent. to the acreage of oats, and they have kept the area of potatoes up to the high and sufficient level of the previous year. These are the three most important crops. They have also not only increased the stock of cattle, which was already the largest on record, but, in spite of unfavorable conditions and a bad lambing season, they have increased the stock of sheep. In view of these facts, I venture to say that British and Irish farmers have shown both patriotism and intelligence, and may fairly claim to have contributed their share to the national effort.

The share of British agriculture in the food supply of the nation is more considerable than is sometimes realized. When I last had the honor to address the British association I ventured to emphasize this point, and I may be allowed to repeat, in a somewhat different form and for a later period, the figures then given. Taking those articles of food which are more or less produced at home, the respective proportions contributed by the United Kingdom, the rest of the Empire, and foreign countries were on the average of the five years 1910–14 as given in the table.

The war has directly affected some of our food supplies by interposing barriers against the exports of certain countries. Fortunately we were in no way dependent for any of these foods upon our enemies, though Germany was one of our main sources of supply for sugar. We received

	United Kingdom, Per Cent.	British Empire Overseas, Per Cent.	Foreign Countries, Per Cent.
Wheat.....	19.0	39.3	41.7
Meat.....	57.9	10.7	31.4
Poultry.....	82.7	0.2	17.1
Eggs.....	67.6	0.1	32.3
Butter (including margarine)...	25.1	13.3	61.6
Cheese.....	19.5	65.4	15.1
Milk (including cream).....	95.4	0.0	4.6
Fruit.....	36.3	8.0	55.4
Vegetables.....	91.8	1.1	7.1

some small quantities of wheat or flour and of eggs from Germany, Hungary and Turkey, some poultry from Austria-Hungary, and some fruit from Germany and Turkey, but the whole amount was insignificant. The practical cessation of supplies from Russia was the most serious loss, as we drew from thence on an average 9 per cent. of our wheat, 9 per cent. of our butter and 16 per cent. of our eggs.

The rather humiliating panic which took possession during the first few days of the war of a certain section of the population, who rushed to accumulate stores of provisions, arose not only from selfishness but from insufficient appreciation of the main facts about food supplies. Our large imports of food are constantly dinned into the ears of the people, but the extent and possibilities of our native resources are practically unknown. It is very natural, therefore, that the man in the street should assume that even a temporary interruption of oversea supplies would bring us face to face with famine.

Within the first few days of the war, the government, through the board of agriculture, obtained returns not only of the stocks of all kinds of food-stuffs in the country but also of the stocks of feeding-stuffs for animals and of fertilizers for the land. Powers were taken under the articles of commerce (returns, etc.) act to compel holders of

stocks to make returns, but it is due to the trading community to say that in only two instances, so far as the board of agriculture was concerned, was it necessary to have recourse to compulsion. The returns of stocks of food-stuffs, feeding-stuffs and fertilizers have been made regularly to the board of agriculture⁹ every month since the outbreak of war, and the loyal cooperation of the traders concerned deserves cordial recognition by those whose official duty has been rendered comparatively easy by their assistance. I may be allowed to add that the readiness with which traders communicated information which was, of course, of a very confidential nature, displayed a confidence in government departments which they may regard with some satisfaction.

A very casual glance at the national dietary suffices to show that John Bull is an omnivorous feeder, and as the whole world has eagerly catered for his table his demands are exigent. But, for various reasons, our daily bread, reluctant though most of us would be to be restricted to it, is regarded as the measure and index of our food supplies. On the 4th of August the board of agriculture published an announcement that they estimated the wheat-crop then on the verge of harvest at 7,000,000 quarters, and that, including other stocks in hand, there was at that time sufficient wheat in the country to feed the whole population for four months; and a few days later, having then obtained further information from about 160 of the principal millers, they stated that the supplies in the country were sufficient for five months' consumption. The board also announced, on August 5, that the potato crop would furnish a full supply for a whole

⁹ Returns in Scotland and Ireland are made to the Agricultural Departments of those countries and the results transmitted to the Board of Agriculture and Fisheries.

year's consumption without the necessity for any addition from imports. When it was further announced that the government had taken steps to ensure against a shortage of sugar it began to be generally realized that at any rate the country was not in imminent danger of starvation. Indeed, on a broad survey of the whole situation, it was apparent that our native resources, together with the accumulated stocks of various commodities held in granaries, warehouses and cold stores, would enable the United Kingdom to face even the unimaginable contingency of a complete blockade of all its ports for a considerable period.

Nevertheless it was abundantly evident, not only to the man in the street, but even to those whose duty it was to consider such matters, that the maintenance of regular supplies was essential to avoid undue depletion of stocks. The risk that a certain number of vessels carrying food to this country might be sunk by the enemy was obvious, and it was at first very difficult to measure it. After a year of strenuous endeavor by the enemy it is satisfactory to record that, although a few cargoes of food-stuffs have been sunk, the effect on supplies has been practically negligible.

Under these circumstances it appeared that, provided adequate protection were given against unusual risks, commercial enterprise might in the main be relied upon to supply the demands of the people in the normal manner and in the usual course of business. It is a self-evident axiom that it is better not to interfere in business matters unless there is a paramount necessity for interference.

The machinery of modern business in a highly organized community is very complicated; the innumerable cog-wheels are hidden while the machine is running normally, but every single one of these becomes

very obvious when you attempt to introduce a crowbar. With one or two exceptions the purveyors of food to the nation were left to conduct their business without official interference, though the board of trade took steps to ascertain what were the retail prices justified by the wholesale conditions and to disseminate the information for the protection of consumers against unreasonable charges.

One measure of a drastic and widespread nature was adopted. The exportation of a large number of commodities was prohibited. This was done for two reasons: (1) to conserve stocks in this country, and (2) to prevent goods from reaching the enemy. The latter object could be attained only very partially by this method so long as any sources of supply other than the ports of the United Kingdom were open to the enemy or to adjoining neutral countries. The former object—with which we are now only concerned—was on the whole achieved. The board of agriculture, concerned for the maintenance of our flocks and herds, at once secured a general prohibition of the exportation of all kinds of feeding-stuffs for animals. Many kinds of food-stuffs were at once included and later additions were made, so that for a long time past nearly all kinds of food have been included, though in some cases the prohibition does not apply to the British Empire or to our Allies. The exportation of fertilizers, agricultural seeds, binder twine and certain other commodities more or less directly connected with the conservation of our food supplies, was also prohibited, so that generally it may be said that the outlet for any food in the country was under effective control. This is not the time or place to discuss the reasons why in some instances limited quantities of certain articles were allowed to escape under license. It is only necessary to remark that in all such cases

there were cogent reasons in the national interest for the action taken.

Direct government intervention in regard to food supplies was limited to three commodities—sugar, meat and wheat. In the case of sugar the whole business of supply was taken over by the government—a huge undertaking but administratively a comparatively simple one, owing to the fact that there are no home-grown supplies. Intervention in the meat trade was necessitated by the fact that the enormous demands of the allied armies had to be met by drafts upon one particular kind of meat and mainly from one particular source. The board of trade cooperated with the war office, and a scheme was evolved whereby a very large part of the output of meat from South America and Australia comes under government control.

As regards wheat, the intervention of the government took two forms. The scheme whereby the importation of wheat from India was undertaken by the British government, in cooperation with the Indian government, arose primarily from conditions in India rather than from conditions in the United Kingdom, although it is hoped and believed that the results will prove to be mutually advantageous. Other than this the intervention of the government in regard to wheat was devised as an insurance against the risk of interruption of normal supplies, its main object being to prevent the stocks of wheat in the country from falling to a dangerous level at a time when the home crop would be practically exhausted. When the home crop is just harvested there are ample reserves in the country for some months, and, as the United States and Canada are at the same time selling freely, stocks held by the trade are usually high. While home-grown wheat remains on the farms it is practically an additional reserve supplementary to the

commercial reserves. When it leaves the farmers' hands, even although it may not actually go into consumption, it becomes part of the commercial reserve. This reserve in the nature of business tends to be constant, but fluctuates within rather wide limits under the influence of market conditions. If the price of wheat rises substantially and the capital represented by a given quantity increases, there is a natural tendency to reduce stocks. If also there is any indication of a falling market ahead, whether from favorable crop prospects or the release of supplies now held off the market for any reason, a prudent trader reduces his stocks to the smallest quantity on which he can keep his business running. So long as shipments reach this country, as in normal times they do, with, as a member of the Baltic once expressed it to me, "the regularity of buses running down Cheapside," the country may safely rely on receiving its daily bread automatically. But if any interruption occurred at a time when the trade, for the reasons just indicated, happened to be running on low stocks, the margin for contingencies might be insufficient. I am, of course, debarred from discussing the method adopted or the manner in which the scheme was carried out, but, as the cereal year for which it was devised is over, it is permissible to state that the object in view was successfully achieved.

Of the 47,000,000 people who form the population of the United Kingdom the large majority are absolutely dependent for their daily food on the organization and regular distribution of supplies. The countryman, even if he possesses no more than a pig and a garden, might exist for a short time, but the town-dweller would speedily starve if the organization of supplies broke down. He does not, perhaps, sufficiently realize the intricacy of the commercial arrangements which make up that organiza-

tion, or the obstacles which arise when the whole economic basis of the community is disturbed by a cataclysm such as that which came upon us thirteen months ago. The sorry catchword "business as usual" must have sounded very ironically in the ears of many business men confronted with unforeseen and unprecedented difficulties on every side. The indomitable spirit with which they were met, the energy and determination with which they were overcome, afford further evidence of that which has been so gloriously demonstrated on land and sea, that the traditional courage and grit of the British race have not been lost.

To the question how have our oversea food supplies been maintained during the first year of the war, the best answer can be given in figures.

Imports of the principal kinds of food during the first eleven months of the war were as under, the figures for the corresponding period of 1913-14 being shown for comparison:

	1914-15, Thous- ands of Cwts.	1913-14, Thous- ands of Cwts.	Increase + or De- crease — Per Cent.
Wheat (including flour)	113,797	113,398	— 1.39
Meat.....	15,868	18,026	—11.97
Bacon and hams.	7,452	5,975	+24.72
Cheese.....	2,766	2,386	+15.93
Butter (including margarine)	5,376	5,748	— 6.47
Fruit.....	18,830	17,512	+ 7.53
Rice.....	9,573	4,840	+97.79
Sugar.....	35,029	38,356	— 8.67

In total weight of these food-stuffs, the quantity brought to our shores was rather larger in time of war than in time of peace. Yet one still occasionally meets a purblind pessimist who plaintively asks what the navy is doing. This is a part of the answer. It is also a measure of the success of the much-advertised German "blockade" for the starvation of England. So absolute a triumph of sea-power in the first year of war would have been treated as a wild

dream by the most confirmed optimist two years ago. The debt which the nation owes to our sailor-men is already immeasurable. That before the enemy is crushed the debt will be increased we may be assured. The crisis of our fate has not yet passed, and we may be called upon to meet worse trials than have yet befallen us. But in the navy is our sure and certain hope.

That which they have done is but earnest of the things that they shall do.

Under the protection of that silent shield the land may yield its increase untrodden by the invading foot, the trader may pursue his business undismayed by the threats of a thwarted foe, and the nation may rely that, while common prudence enjoins strict economy in husbanding our resources, sufficient supplies of food will be forthcoming for all the reasonable needs of the people.

R. H. REW

THE MANCHESTER MEETING OF THE BRITISH ASSOCIATION

In an account of the meeting *Nature* states that the number of members and associates (1,438), although satisfactory in the circumstances, was small as compared with previous meetings. But it is said that the section rooms were well filled both in the morning and afternoon sittings, and the proceedings were of exceptional interest.

The reception by the Lord Mayor in the School of Technology on Wednesday evening was the only general social function of the week, but being fixed on the second day of the meeting it gave a welcome opportunity to members to meet their friends as well as to inspect the machinery, appliances and lecture-rooms with which this great institution is equipped. The arrangements made by the committee for the visits of members to factories, warehouses, municipal undertakings and various places of special interest in Manchester and district worked well, and the short excursions were well attended. The citizen's lectures given in Manchester and other towns